

Trend Study 21B-7-03

Study site name: Bennett Field.

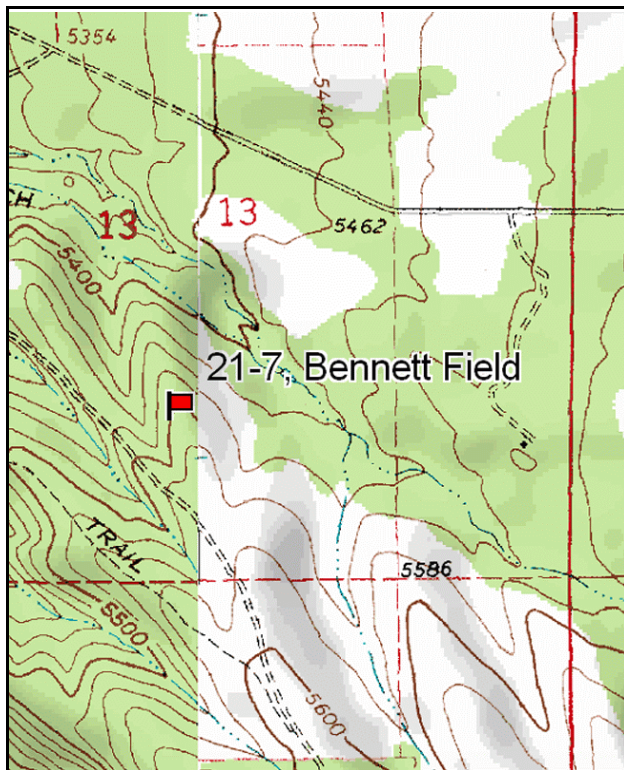
Vegetation type: Cliffrose chaining.

Compass bearing: frequency baseline 170 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

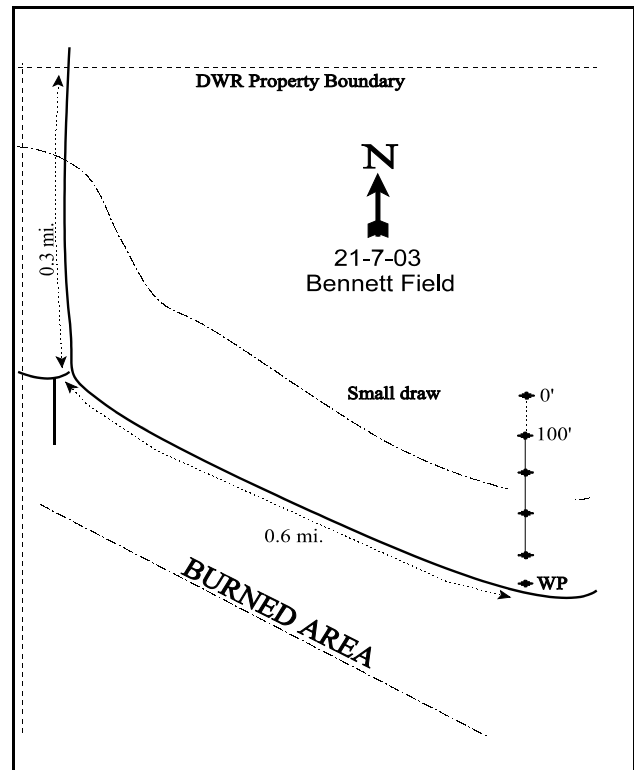
LOCATION DESCRIPTION

Take I-15 exit #174 south of Holden. From the interchange proceed 0.9 miles straight east on a dirt road (towards Maple Canyon). Just after the cattleguard, turn right. Go 0.1 miles to a gate to DWR property. Proceed 0.3 miles down across a wash and over to a 3-way split. Follow the main road which bends to the left. Go 0.6 miles near the top of a small ridge. There is a witness post (steel rebar 3 feet tall) on the left side of the road. The 400' stake is 30 feet away from the witness post, bearing 15 degrees magnetic. The frequency baseline starts 400 feet further north and the 0-foot stake is tagged #7184.



Map Name: Holden

Township 20S, Range 4W, Section 13



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4325075 N, 391798 E

DISCUSSION

Bennett Field - Trend Study No 21-7

The Bennett Field study is located on Division land two miles southeast of Holden. The study is located on a moderate slope (10%) that drains to the west-southwest at an elevation of 5,500 feet. The area was chained in 1958 and is now dominated by basin big sagebrush, cliffrose, and scattered juniper. Much of the land to the south and west was burned by a wildfire. Cheatgrass was noted as becoming more dominant in the understory following the fire. Livestock grazing was heavy in the past, but forage for livestock is quite limited at present except for cheatgrass in the spring. This site receives heavy deer use in the winter and spring. Deer pellet groups are dense and literally cover the ground around the cliffrose plants. Pellet group transect data taken in 1998 and 2003 estimated deer use at 131 days use/acre (324 ddu/ha) and 162 days use/acre (400 ddu/ha) respectively. A few elk pellet groups were encountered in 1998, but there were no signs of cattle use on the site in either 1998 or 2003. A thick stand of juniper one-quarter mile to the northeast provides escape and thermal cover. On the site, point quarter data estimated juniper density at less than 25 trees/acre in both 1998 and 2003.

Soil on the site is moderately shallow with an effective rooting depth estimated at just over 10 inches. Due to the presence of basin big sagebrush, a deep rooted species, effective rooting depth estimates are most likely underestimated because of rock and a hardpan within the profile. It was reported in 1985 that a hard pan was present about 1½ feet from the surface. Although this layer obstructed soil penetrometer readings, it is not a barrier to rooting for sagebrush and cliffrose. Erosion is negligible due to the soil surface being nearly completely covered with herbaceous vegetation and litter. In 2003, the biggest changes for soils was a decrease in litter cover and corresponding increase in bare ground. Soils were given a stable rating from an erosion condition class assessment in 2003.

The browse component consists primarily of Stansbury cliffrose and Utah juniper in the overstory and a moderately dense stand of basin big sagebrush in the understory. Sagebrush density was estimated at around 3,000 plants/acre in 1985 and 1991, but closer to 2,000 plants/acre in 1998 and 2003. The change in density is partly due to the much larger sample size used after 1992. For the most part, sagebrush has been vigorous and has shown light to moderate use in all years. Individual sagebrush plants adjacent to cliffrose have sustained the heaviest use. Sagebrush reproduction has been low in all samples with very few young sagebrush and no seedlings being encountered. Percent decadence has slowly increased with each sampling to a high of 44% in 2003. In addition, nearly one-half of the decadent age class was classified as dying in 2003, which equates to 360 plants/acre. Annual sagebrush annual leaders averaged just over 2 inches of growth when the site was read in May 2003. Cliffrose is definitely the preferred forage species on this site. Most of the cliffrose on the site are tall, tree-like forms that have been highlined and are mostly unavailable to browsing animals. Any available branches are heavily utilized by wintering deer. Utilization was classified as extremely heavy in 1985 and 2003, but much lighter in 1991 and 1998. In 1985, grasshoppers did a lot of damage to the new growth on the cliffrose, completely stripping the twigs of leaves. Stickyleaf low rabbitbrush and broom snakeweed, both less desirable increasers, occurred in low densities in 2003.

The invasive cheatgrass is the predominant species in the understory. It maintained the highest nested frequency and average cover values of any herbaceous species in 1998 and 2003. Perennial herbaceous vegetation, both grasses and forbs, is limited. Sandberg bluegrass is the most abundant perennial grass but as the plants are very small, forage value is low. This species did increase in nested frequency and average cover in 2003. The forb component consists almost entirely of two annual species, pale alyssum and storksbill, which provided 93% of the total forb cover in both 1998 and 2003. No perennial forbs were sampled in 1985, although they remain in low abundance, few have been encountered since. Sum of nested frequency for perennial forbs has slowly increased since 1985 with sego lily, desert parsley, and longleaf phlox being the

most abundant species sampled in 2003. Grasshopper damage on the grasses was very heavy in 1985.

1985 APPARENT TREND ASSESSMENT

The soil is moderately deep and has a low water holding capacity because of its coarseness, but erosion is minimal. Soil is building under the junipers and other browse species. Overall, the soil trend appears stable. Vegetative trend appears to be declining. Basin big sagebrush is vigorous, but there is little reproduction. The cliffrose has sustained heavy hedging and insect damage. It is largely unavailable due to height and reproduction is low. Forage production by herbaceous species is negligible. The absence of productive grasses and forbs and the declining productivity of the browse species makes this site a leading candidate for revegetation work in the future.

1991 TREND ASSESSMENT

Basic cover characteristics have changed, but not all changes are improvements. Basal vegetative cover decreased substantially from 6% down to only about 2%. Rock and pavement cover decreased from 15% to 11%. Percent litter has increased from 62% to 74%, mostly from cheatgrass. Percent bare ground has decreased to 10%. Even though vegetative cover has decreased, this is more than compensated for by increases in litter cover and decreases in percent bare ground. Trend for soil is stable at this time, but a wildfire could change this dramatically in a very short time because of the high amounts of cheatgrass in the community. Browse trend would be considered slightly downward because both the sagebrush and cliffrose populations decreased through this period with accompanying increases in percent decadence. Broom snakeweed density has increased by 68% since 1985. There are not many species found in the understory and only two perennial grass species, bluebunch wheatgrass and Sandberg bluegrass, were encountered. Sandberg bluegrass is the only common species (91% quadrat frequency). Bluebunch wheatgrass was not found on this site until 1991. This situation has been noted in many other communities with bluebunch wheatgrass increasing on many sites during this extended drought. There were no perennial forbs sampled in 1985, but now there are six species on the site. Trend for herbaceous understory is slightly improving, but remains in poor condition because of the dominance of annuals, especially cheatgrass.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly improving (4)

1998 TREND ASSESSMENT

Trend for soil is stable. Percent cover for bare ground has declined from 10% to 6%, but litter cover has also decreased from 74% to 70%. Trend for browse is down slightly. Basin big sagebrush shows a steady increase in decadence and a lack of adequate reproduction. In addition, dead sagebrush which were first counted in 1998, are abundant at 660 plants/acre, or 25% are dead. The cliffrose is more stable but recruitment is limited and mature plants are becoming increasingly less available to browsing due to height. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency of perennial grasses and forbs. Nested frequency of Sandberg bluegrass declined significantly. Cheatgrass and pale alyssum dominate the understory by providing 88% of the herbaceous cover. Perennial forbs are rare.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - down slightly (2)

2003 TREND ASSESSMENT

Trend for soil is stable. Although bare ground increased and litter cover decreased, the ratio of protective cover to bare soil remained almost the same. Vegetation cover remained stable while cryptogams increased in 2003. Perennial grasses and forbs showed increased nested frequency values which is important as herbaceous vegetation is a key factor to soil stability. Trend for browse is slightly down. The key species, basin big sagebrush and cliffrose, both show declines in density and increases for those classified as exhibiting poor vigor and higher decadence. Reproduction for both species is very low. These negative characteristics in the key browse populations are in large part due to drier conditions compared to 1998. Sustained use of these shrubs by wildlife may also be a causative factor for declining health of these populations. The herbaceous understory trend is slightly up. Even with below normal spring precipitation in the Fillmore area in 2003, nested frequency values of several perennial species significantly increased, most notably Sandberg bluegrass. Bulbous bluegrass, a low value perennial, also significantly increased. The forb component remains dominated by annuals, primarily pale alyssum and storksbill. However, the frequency of several perennials increased in 2003 including sego lily, desert parsley, and longleaf phlox.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Management unit 21 , Study no: 7

T y p e	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	a ⁻	b ¹⁷	c ³⁹	bc ³⁴	.96	1.79
G	Bromus japonicus (a)	-	-	3	-	.00	-
G	Bromus tectorum (a)	-	-	b ³²¹	a ³⁰⁵	27.62	13.06
G	Poa bulbosa	a ⁻	a ⁻	a ⁴	b ⁸¹	.04	2.94
G	Poa secunda	b ²⁴¹	b ²⁵¹	a ¹⁶⁵	b ²⁶⁴	3.45	7.94
G	Secale cereale (a)	-	-	2	-	.00	-
G	Sitanion hystrix	-	-	9	-	.09	-
Total for Annual Grasses		0	0	326	305	27.63	13.06
Total for Perennial Grasses		241	268	217	379	4.55	12.67
Total for Grasses		241	268	543	684	32.19	25.73
F	Alyssum alyssoides (a)	-	-	b ³⁴¹	a ³⁰⁵	12.89	8.22
F	Allium spp.	-	-	4	6	.15	.06
F	Astragalus spp.	-	-	-	-	-	.00
F	Calochortus nuttallii	a ⁻	b ¹⁷	a ⁻	b ¹⁸	-	.06
F	Castilleja spp.	-	-	2	-	.03	-
F	Cirsium spp.	-	2	-	2	-	.00
F	Collinsia parviflora (a)	-	-	a ⁻	b ⁹	-	.02

T y p e	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Crepis acuminata	-	3	-	2	-	.03
F	Erodium cicutarium (a)	-	-	_a 51	_b 121	.13	3.77
F	Galium spp.	-	-	-	3	-	.03
F	Holosteum umbellatum (a)	-	-	-	8	-	.01
F	Lactuca serriola	-	-	2	-	.00	-
F	Linum lewisii	-	1	6	3	.10	.00
F	Lomatium spp.	_a -	_a 5	_a -	_b 27	-	.16
F	Petradoria pumila	-	-	4	3	.41	.15
F	Phlox longifolia	_a -	_b 13	_a 1	_b 11	.01	.08
F	Ranunculus testiculatus (a)	-	-	-	73	-	.21
F	Tragopogon dubius	-	-	6	4	.21	.00
F	Zigadenus paniculatus	-	-	-	4	-	.01
Total for Annual Forbs		0	0	392	516	13.02	12.25
Total for Perennial Forbs		0	41	25	83	0.91	0.60
Total for Forbs		0	41	417	599	13.93	12.85

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 21 , Study no: 7

T y p e	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia tridentata tridentata	71	63	10.39	15.50
B	Chrysothamnus viscidiflorus viscidiflorus	1	0	-	-
B	Cowania mexicana stansburiana	14	16	4.11	2.66
B	Gutierrezia sarothrae	32	8	.81	.09
B	Juniperus osteosperma	2	1	.15	.68
Total for Browse		120	88	15.47	18.93

CANOPY COVER, LINE INTERCEPT --

Management unit 21 , Study no: 7

Species	Percent Cover	
	'98	'03
Artemisia tridentata tridentata	-	17.35
Cowania mexicana stansburiana	3.20	10.00
Juniperus osteosperma	1.00	1.78

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 21 , Study no: 7

Species	Average leader growth (in)
	'03
Artemisia tridentata tridentata	2.2

POINT-QUARTER TREE DATA --

Management unit 21 , Study no: 7

Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Cowania mexicana stansburiana	N/A	169	N/A	8.7
Juniperus osteosperma	24	17	3.5	7.2

BASIC COVER --

Management unit 21 , Study no: 7

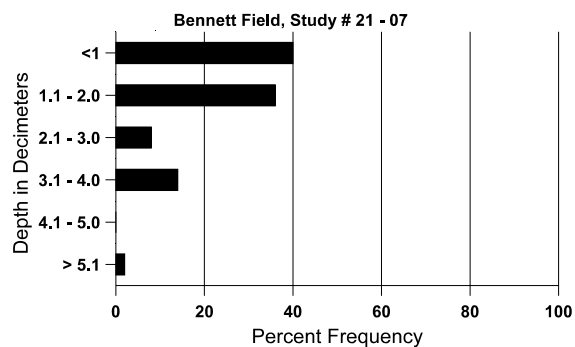
Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	6.00	2.25	54.45	54.18
Rock	2.50	4.25	2.92	3.19
Pavement	11.75	7.25	5.23	1.27
Litter	62.00	74.25	70.33	39.44
Cryptogams	0	2.25	2.04	5.81
Bare Ground	17.75	9.75	5.70	14.69

SOIL ANALYSIS DATA --

Management unit 21, Study no: 7, Study Name: Bennett Field

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
10.6	56.4 (11.4)	6.9	48.7	27.7	23.6	3.2	7.5	140.8	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 21 , Study no: 7

Type	Quadrat Frequency		Days use per acre (ha)	
	'98	'03	'98	'03
Rabbit	20	16	-	-
Elk	1	2	2 (5)	-
Deer	57	55	131 (324)	162 (400)
Cattle	3	-	-	-

BROWSE CHARACTERISTICS --

Management unit 21 , Study no: 7

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata tridentata											
85	3332	-	66	2533	733	-	44	4	22	2	33/32
91	2999	-	133	1933	933	-	33	2	31	9	28/27
98	1960	-	60	1100	800	660	26	3	41	12	35/42
03	1800	-	20	980	800	640	24	6	44	20	35/42
Chrysothamnus viscidiflorus viscidiflorus											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	66	-	-	66	-	-	0	0	-	0	18/31
98	60	-	20	40	-	-	0	0	-	0	8/10
03	0	-	-	-	-	-	0	0	-	0	13/16

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Cowania mexicana stansburiana</i>											
85	466	-	-	200	266	-	14	86	57	29	60/46
91	399	66	-	133	266	-	0	17	67	0	26/21
98	480	20	60	360	60	40	21	0	13	0	77/69
03	360	-	-	200	160	100	11	67	44	17	84/72
<i>Gutierrezia sarothrae</i>											
85	533	-	-	133	400	-	0	0	75	0	9/7
91	1666	-	333	1333	-	-	0	0	0	0	10/9
98	1080	40	240	820	20	20	0	0	2	2	10/10
03	220	-	20	180	20	180	0	0	9	9	5/6
<i>Juniperus osteosperma</i>											
85	0	-	-	-	-	-	0	0	0	0	-/-
91	0	-	-	-	-	-	0	0	0	0	-/-
98	40	-	-	20	20	-	0	0	50	0	-/-
03	20	-	-	-	20	-	0	0	100	100	-/-